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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,573	05/14/2004	Sivananda K. Kanakasabapathy	FIS920040076US1	3572
29371	7590	04/06/2006	EXAMINER	
CANTOR COLBURN LLP - IBM FISHKILL			SARKAR, ASOK K	
55 GRIFFIN ROAD SOUTH			ART UNIT	
BLOOMFIELD, CT 06002			PAPER NUMBER	
			2891	
DATE MAILED: 04/06/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/709,573

Applicant(s)

KANAKASABAPATHY ET AL.

Examiner

Asok K. Sarkar

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 March 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 11-14 is/are rejected.
- 7) ☒ Claim(s) 9 and 10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                    |                                                                             |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____                                                |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>5/04</u> .                                                                | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Group I claims 1 – 14 in the reply filed on March 21, 2006 is acknowledged.
2. Claims 15 – 20 were withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II claims, there being no allowable generic or linking claim. Election was treated as being made **without** traverse in the reply filed on March 21, 2006.

### ***Claim Objections***

3. Claim 8 is objected to because of the following informalities: In line 7, the phrase "said etch stop layer" should be replaced with "said second cap layer". Appropriate correction is required.
4. Claim 13 is objected to because of the following informalities: In line 1, the phrase "cap layer" does not have a proper antecedent basis as two cap layers are used. For examination purpose, it is considered to be the first cap layer. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1 – 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee, US 2005/0102720.

Regarding claim 1, Lee teaches a cap structure for a magnetic random (MRAM) access memory device, comprising:

- a cap layer formed over a magnetic tunnel junction (MTJ) stack layer (paragraph 35, Fig. 5);
- an etch stop layer 12 formed over said first cap layer (paragraph 37, Fig. 5); and
- a hardmask layer 25 formed over said etch stop layer 12 (paragraph 38, Fig. 6a);

wherein said etch stop layer is selected from a material such that an etch chemistry used for removing said hardmask layer has selectivity against etching said etch stop layer material. Etch selectivity of the etch stop and the hard mask layers are inherent properties of the materials used.

Regarding claims 2 and 3, Lee teaches etch stop layer comprises Al, which is a nonmagnetic, electrically conductive material in paragraph 37.

Regarding claims 4 and 5, Lee teaches the etch stop layer is removable using an oxygen based etch chemistry and the etch stop layer is selected to be corrosion resistant with respect to halogen based etch chemistries and the etch stop layer is further selected to be resistant to post – etch aqueous cleaning process in paragraph 43.

Regarding claim 6, Lee teaches cap layer comprising Ta in paragraph 34.

7. Claims 8 and 11 – 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Kumar, US 2003/0181056.

Regarding claim 8, Kumar teaches a cap structure for a magnetic random access Memory (MRAM) device, comprising:

- a first cap layer 210 formed over a magnetic tunnel junction (MTJ) stack layer 205 – 208 (Fig. 2A);
- an etch stop layer 212 formed over said first cap layer (Fig. 2A);
- a second cap layer 214 formed over said etch stop layer 212 (Fig. 2A); and
- a hardmask layer 213 formed over said second cap layer 214 (Fig. 2A);

wherein said etch stop layer is selected from a material such that an etch chemistry used for removing both said hardmask layer and said second cap layer has selectivity against etching said etch stop layer material are inherent due to the materials used in the structure in paragraphs 22 – 27.

Regarding claim 11, Kumar teaches etch stop layer is removable using an oxygen based etch chemistry in paragraph 28.

Regarding claim 12, Kumar teaches the etch stop layer is selected to be corrosion resistant with respect to halogen based etch chemistries and the etch stop layer is further selected to be resistant to post – etch, aqueous cleaning processes in paragraph 32.

Regarding claim 13, Kumar teaches the first cap layer 210 comprising Ta in paragraph 23.

Art Unit: 2891

Regarding claim 14, Kumar teaches the hard mask layer 213 comprising TiN in paragraph 27.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee, US 2005/0102720 in view of Yates, US 2005/0191764.

Lee fails to teach hardmask layer comprising TiN.

Yates teaches hardmask layer of TiN in paragraph 28 for the benefit of defining an MRAM bit etch mask in paragraph 7.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Lee and use a hardmask comprising TiN 28 for the benefit of defining an MRAM bit etch mask as taught by Yates in paragraph 7.

***Allowable Subject Matter***

12. Claims 9 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in corrected form including all of the limitations of the base claim and any intervening claims.

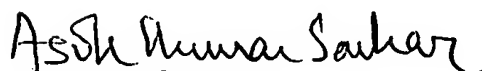
***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on 571 272 1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2891

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Asok K. Sarkar

April 3, 2006

Primary Examiner